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QUESTION 2: Does the use of tantalum (Ta) augments during a single-stage revision for periprosthetic joint infection (PJI) influence the rate of surgical site infections (SSIs) or PJIs?

RECOMMENDATION: Findings of retrospective studies suggest that tantalum augments might have a protective effect against subsequent infection following single-stage revision joint in the context of PJI.

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 58%, Disagree: 31%, Abstain: 11% (Simple Majority, No Consensus)

RATIONALE

The interaction between organisms and metals used in orthopaedic surgery has been the subject of debate and investigation. Sheehan et al. [1] showed that Staphylococcal species showed greater adherence to stainless steel compared to titanium (Ti) in a rabbit model. Trabecular metal (Ta-coated) has been a popular addition to the armamentarium of the revision hip surgeon. Because of its bioactive nature and ingrowth properties, Ta is being used in primary as well as revision arthroplasty components, with good to excellent early clinical results [2-3].

It has been hypothesized that Ta might protect against infection. Schildhauer et al. [4] found that *Staphlococcus aureus* was significantly less adherent to pure Ta when compared to Ta-covered stainless steel and commercially pure Ti and Ti alloy (T1 – 6AL – 4V). However, in this study *S. epidermidis* exhibited similar adherence behavior between these metals.

Schildhauer et al. [5] also examined human leukocyte activation in the presence of Ta compared to other orthopaedic materials. They found that the extent of leukocyte activation was directly related to surface roughness. Cytokine release and phagocytic activity were both increased in the presence of Ta-conditioned media.

In a retrospective clinical study of revision total hip arthroplasty (THA) using Ta or Ti implants, 144 hips were evaluated for which revision had been performed because of infection. Failure due to a subsequent infection was 3.1% (2 of 64) in the Ta group and 17.5% (14 of 80) for the Ti group ($p = 0.006$) [6]. In a study of revision total knee arthroplasty (TKA), Ta metaphyseal cones were implanted in 21 patients (16 aseptic and 5 septic). At a mean follow-up of 36 months, only one reconstruction was removed due to persistent infection and all metaphyseal cones showed evidence of stable osteointegration [7].The results of these clinical studies also suggest that Ta might be protective against infection following revision THA and TKA.

More recently, Harrison and colleagues [8] assessed the intrinsic antibacterial properties of Ta compared to Ti acetabular components in a well-designed and controlled in vitro study. They found no difference between the two metals in terms of resistance to colonization with *S. aureus* and *S. epidermidis*.

The results of reconstruction of acetabular defects using Ta augments have been encouraging in the early and medium term. Klatte et al. [12] performed a case-control study assessing the influence of Ta augments on reinfection rates in patients who had undergone single-stage revision THA for infection. This was a retrospective case-controlled study using cohorts that were well-matched, and infection was diagnosed based on accepted, standardized criteria. There were no significant differences in the duration of surgery, blood transfusion rates or antibiotic protocols used with each group. There was no difference observed in the reinfection rates in either group (two cases in each group). Although the findings of Klatte et al. are interesting, the numbers involved were small and the presenting center has a vast experience with single-stage revision hence surgical technique as well as multidisciplinary management with a dedicated specialist microbiologist might have contributed to these results as well.

The literature certainly suggests that Ta has potentially important benefits in the reconstruction of acetabular defects. However, there is no clear evidence that acetabular augments result in a reduced incidence of infection when used in single-stage revision THAs for PJIs.

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